

## Detention Basin Retrofitting

In an effort to keep local streams and rivers clean, The City of Elgin is working on retrofitting its stormwater detention facilities to improve the community's water quality. Historically, detention facilities were designed solely for flood control. These facilities had concrete channels that moved stormwater quickly through the basin and kept the bottom of the basin dry so it could be mowed. With the City's transformation into a community focusing on sustainable practices and the creation of the [Sustainability Action Plan \(SAP\)](#), it has adopted an approach to improve stormwater quality and decrease stormwater facility maintenance.

### Jayne Industrial Basin

In early 2011, the detention basin at the corner of McLean Blvd. and Holmes Rd was the first of the City's basins to be retrofitted. The project consisted of removing the concrete lined channel and installing native and wetland plantings after re-grading the basin. Detention basin retrofitting is an example of a Stormwater Best Management Practice (BMP). A Stormwater BMP is a practice used to manage the impacts of stormwater runoff. Other examples of stormwater BMPs are wetlands, rain gardens, swales, and permeable pavement.

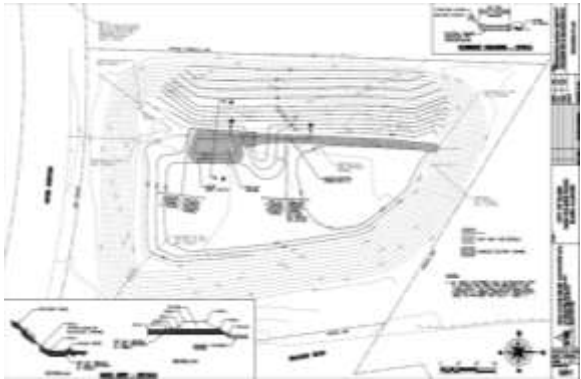
The removal of the concrete channel slows the flow of water and diverts the water onto the stormwater basin floor. This allows some of the pollutants in the water to settle out and be absorbed by the plants and microorganisms in the soil of the basin floor. By replacing the basin's turf grass with native plantings, the required maintenance of the basin has decreased. Turf grass is unsustainable because it requires regular mowing, watering, fertilizing, and weed control. Native plantings are a more sustainable alternative because they are drought resistant, promote infiltration and biodiversity, and require little maintenance. With dense root systems making up two thirds of their biomass, native plantings enrich the soil with their organic matter. They also have high water-holding capacities and draw water deep into the earth, replenishing the shallow aquifer, because of the great depths their roots reach.



Native plants support biodiversity by providing food and habitats for native birds and insects. The growing point of prairie plants is just below the surface, making them resistant to fire; an annual controlled burn is used to maintain the plants and fertilizes the plants with its ash.



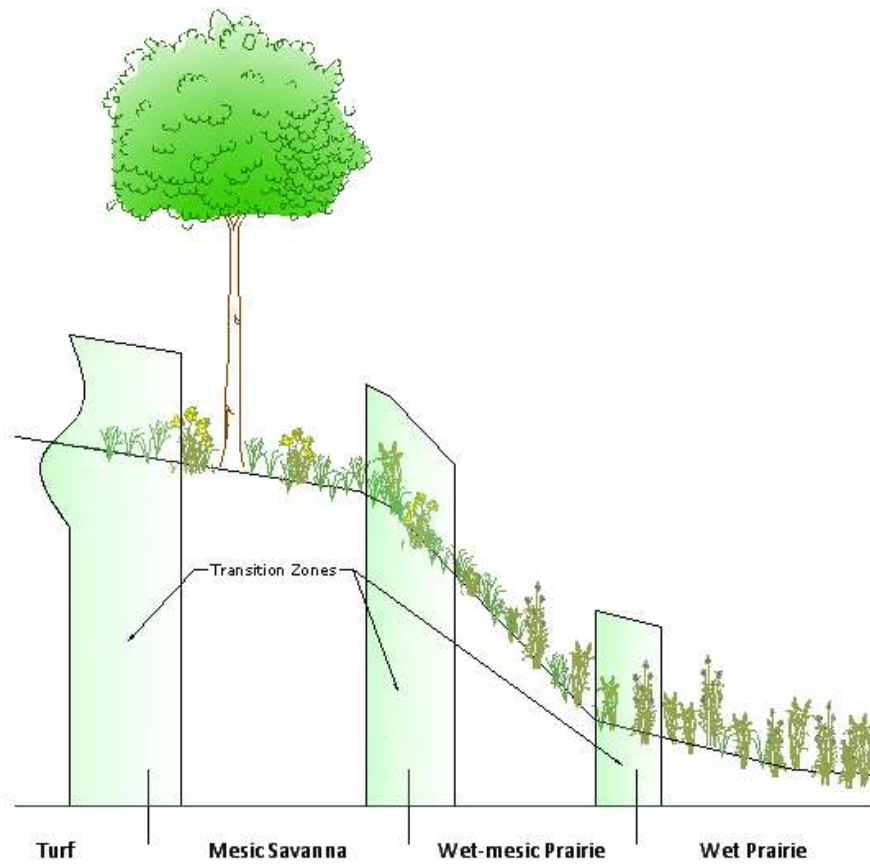
Before



After

### Three Tiered Prairie Community

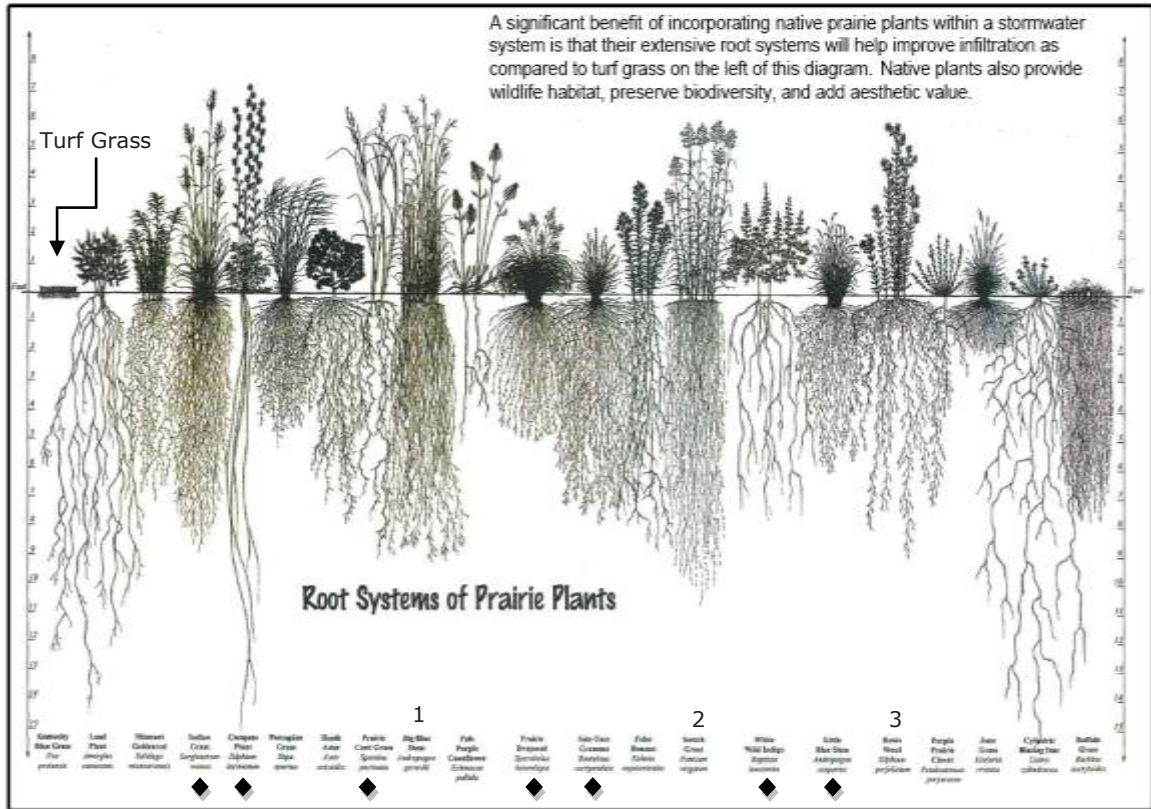
The basin has been converted into a three-tiered prairie system, comprised of a wet prairie community, a wet-mesic community, and a mesic savanna community. The first tier consists of wet prairie plantings that tolerate inundation and saturated soils or extend periods after storm events. The second tier occupies the better drained portion of the basin floor and transitions up the side slopes of the basin. This wet-mesic prairie tolerates a drier hydrological regime and periodic inundation after typical two-year storm events. The third tier is established on the well drained side slopes and the basin perimeter and includes trees and shrubs. Illustrated below is a typical profile of the basin.



### Native Plants

The native and wetland plantings were installed on May 17, 2011. Below, the left-hand picture shows the plantings positioned between cones before installation. The right-hand picture shows the native plugs being planted and the erosion control blanket being laid.





Above is an illustration of the plant heights and root depths of common prairie plants. Descriptions of some of the native plantings installed in the basin along with images of the plantings when mature are provided below. Big Bluestem, Rosin Weed, and Switchgrass, described below, are labeled as 1, 2, and 3, respectively, on the prairie plant root system illustration above. Other plants present in the basin and also depicted above include Indian Grass, Compass Plant, Prairie Cord Grass, Prairie Dropseed, Side Oats Gramma, White Wild Indigo, and Little Bluestem. These plants are marked on the prairie plant root system figure with a black diamond.

Big Bluestem, also known as Turkey Foot, grows to heights of 3-10 feet. The main roots of the Big Bluestem can extend downward to 10 feet. As it matures, the stem base turns to a shade of blue-purple. Big Bluestem is used for erosion control and serves as excellent forage for livestock. (1)





Switchgrass blooms in the mid summer and reach heights of approximately 3 to 5 feet, with roots reaching depths of 11 feet. Switchgrass is used for erosion control, wildlife habitat and food, and there has been recent interest in using Switchgrass as a renewable biofuel resource. (2)

The Rosin Weed, also known as the Cup Plant, grows to be almost 10 feet tall with roots extending downward to 10 feet. It has green foliage and yellow flowers. (3)



Eastern Purple Coneflower, also known as *Echinacea purpurea*, blooms from early to late summer. The Eastern Purple Coneflower has rigid, unbranched stems and hairy, rough leaves. When fully mature, purple cone flowers are about 1 foot tall. Echinacea is widely used as an herbal remedy.

The Fox Sedge blooms from May through June. It grows to be approximately 3 feet tall when fully mature and the main roots extend downward to approximately 16 feet. The Fox Sedge thrives on moist, open ground like in swamps, prairies, and along marshes





Cardinal Flowers can reach 6 feet tall and bloom in the summer. They have unbranched stems and topped with fire engine red flowers and blue fruits. The roots of Cardinal Flowers extend downward to 12 feet. Hummingbirds are attracted to the nectar of this plant.

Prairie Blazing Stars have green foliage, purple flowers, and brown seeds/fruits. This plant blooms in the middle of summer and reaches 3½ feet tall when fully mature, with roots going as deep as 14 feet. Prairie Blazing Star is used for prairie restoration and wildlife food and habitat.



The New Jersey Tea is considered to be a perennial shrub that blooms late in the spring. The New Jersey Tea grows to almost 3 feet with 14 feet deep roots, but it grows slowly.

The Bluejacket is a spring flowering bulb that produces navy blue, spiked flowers. It grows to approximately 10 inches in height.





The Swamp Milkweed has green foliage, red flowers, and brown seeds. The Swamp Milkweed blooms in the fall. The plant can reach up to 5 feet when fully mature and has roots that spread up to 18 feet deep.

Tall Tickseed thrives in sunny habitats and has green foliage and yellow flowers. When fully mature, Tall Tickseed reaches heights between 3 and 7 feet.



Butterfly Milkweed reaches heights of 1½ to 3 feet when fully mature and bloom throughout the summer. Butterfly Milkweed used to be used widely for medicinal purposes.

Virginia Iris have slightly fragrant flowers that range in color from deep violet to pinkish-white. When fully mature, Virginia Iris grow to be approximately 3½ feet tall with roots 6 feet deep.





The Sweet Coneflower branches occasionally and is 2½ to 4 feet tall. The leaves are soft and covered with fine white hairs. Sweet Coneflowers thrive in moist, sunny habitats. The roots of Sweet Coneflowers spread up to 5 feet deep.

### **Maintenance**

The biggest threat to preventing the establishment of a native savanna community is non-native and aggressive species outcompeting slower growing native species. Diligent maintenance and monitoring of the restored community is required for the first few years to ensure successful establishment. Typically, an ecological professional will perform an annual maintenance consultation for the first 4 or 5 years. The professional will advise on maintenance practices including treatment of invasive species and identification of native species, as well as mowing and prescribed burn frequency cycles.

During the first growing season, the native species will use most of their energy into developing their root systems and will not grow very tall. There will not likely be enough vegetative matter to carry a prescribed burn during the first two years of establishment so mowing will be an important maintenance tool for this time. Along with mowing, the basin will be maintained with the use of herbicide spot treatments using a low-volume foliar spray for the first few growing seasons.

By approximately 2013, the community will be more established and a prescribed controlled burn will be the primary maintenance tool. Annual burning is used to control undesirable woody, cool-season vegetation and stimulate growth of desirable, warm-season species. Many native species rely on fire and heat for germination, so a controlled burn is necessary for successful establishment. After 2015, an ecological professional will inspect the basin and develop a reduced burn frequency cycle that includes a prescribed burn once every 3 to 4 years. Appropriate firebreaks will be established prior to the burn in order to contain the fire in a controlled area. Firebreaks are anything that will stop a fire and can range from a plowed field, a road, or a mowed path.

### **Sustainability Action Plan**

The Phase 1 Sustainable City Master Plan, begun in 2009 and completed in the summer of 2010, provided the City with a sustainable vision and desire for a community based, structured planning process. The SAP is action oriented and focuses on citizen involvement and education, while Phase 1 addressed theoretical opportunities. The SAP provides low cost, short term recommendations along with long term policy and operational recommendations, while keeping in mind the overall



mission: to improve the quality of life for Elgin citizens and improve its local environment, while making Elgin a more viable and vibrant place to live.

The SAP has utilized citizen volunteer groups to establish sustainability goals and develop recommendations on how to achieve them. The volunteer groups are not comprised of professionals in the environmental design field, but rather of citizens interested in improving Elgin's environmental footprint and committed to making reasonable and viable recommendations. Citizen working groups researched the following nine areas of sustainability: Alternative Energy, Green Building Technology, Healthy Living & Community Education, Transportation & Mobility, Water Resources, Economic Development, Green Infrastructure, Recycling & Waste Management, and Urban Design.

The three goals developed in the Water Resources section of the SAP are to encourage water conservation, educate residents about pollutants that affect Elgin's water supply, and improve water quality throughout Elgin's waterways. The detention basin retrofitting project at McLean Blvd and Holmes Rd contributes to several of the objectives as described below.

An informational sign was installed at the basin to educate citizens about the retrofitting project. Water quality tests were performed before the retrofitting project began to illustrate the water quality benefits of the basin retrofit by contrasting nitrate and phosphorous levels before and after the retrofitting is finished and plantings are established. Xeriscaping, used in the basin retrofit at McLean Blvd and Holmes Rd, is the method of landscaping that strives to conserve water through the use of native, drought resistant plantings, utilizing natural drainage patterns, limiting turf area and utilizing larger shrubs and trees for natural shading effects.